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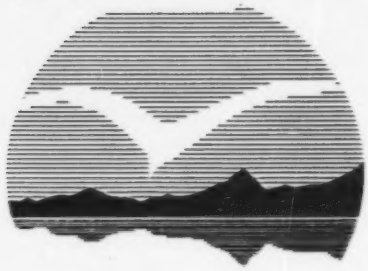

INLAND WATERS DIRECTORATE
WESTERN AND NORTHERN REGION

NETWORK EVALUATION
and
PLANNING COMMITTEE

ANNUAL REPORT
1989 - 90

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October, 1990

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INTRODUCTION

During 1985-1986, the Water Resources Branch (WRB) completed a Hydrometric Network Evaluation and Planning study for the Western and Northern Region (WNR). The objective of the study was to idenify the requirements for water level, streamflow, and sediment information in the region and to define the adjustments to existing networks. The study focused on the hydrometric and sediment network requirements to fulfill federal monitoring responsibilities, and to define the regional hydrologic and sediment regimes. The report recommended that the existing regional networks be adjusted to satisfy present information needs and provided the framework for meeting future needs. Ongoing hydrologic studies and network analyses are being carried out in each district to define and rank the potential adjustments in terms of stations and locations.

As a consequence of this cooperative effort, the Network Evaluation and Planning Committee (NEPC) was established comprising the Regional Hydrologists from each of the WRB districts, a representative of the IWD Yellowknife office, and specialists from the headquarters Hydrology Division, the headquarters Sediment Section, and, more recently, the Water Survey of Canada Division.

The Committee was directed to coordinate network planning activities in the region, develop staff capabilities in network planning, and identify data and information needs among clients, cooperators, and users.

Specific work plans prepared and coordinated by the Committee included assembling basic inventory material on the networks and their principle characteristics, carrying out hydrologic appraisals of regional hydrologic patterns and stations, and preparing and distributing relevant reports and information regarding the networks and the resource.

The work of the Committee is consistent with the Branch's overall Network Planning Strategy and Sediment National Action Plan, and with similar approaches being followed by international water agencies (WMO) and hydrometric agencies in other countries (Australia, USA, Switzerland, and others).

The importance of these network planning and coordination activities relates to the growing number and diversity of environmental issues that require surface water information, as well as the growing demand for real-time and historical data among water planning, design, and operational users. Several key developments account for these pressures:

- The work of the Brundtland Commission highlighted the economic and environmental crises faced by the world's nations, including urbanization, toxic wastes, and desertification, all of which impact on

water resources in Canada. To achieve the challenge of Sustainable Development will require new and more comprehensive water data bases in the coming decades.

- The Federal Water Policy established the need to incorporate the real value of water into environmental and economic decision-making, and set out major policies for encouraging the sustainable development of the nation's water. One of these was to establish and maintain adequate databases.

- The Department's Environmental Agenda is based upon the strategy of anticipating and preventing environmental problems. It incorporates the need for adequate water data networks for the purposes of impact assessment and environmental forecasting.

- IWD's Strategic Plan focuses on the strategies of integrated water planning, forecasting, and the application of scientific knowledge of aquatic systems to ensure sustainable development.

All of these major initiatives are, and will continue to draw upon water data and information in new and unforeseen ways. Therefore the steps already taken by the WNR Network Evaluation and Planning Committee are both timely and essential. For example, recent reviews of our hydrometric networks, both regionally and nationally, have concluded that current networks are inadequate to meet present and future needs for water information. The WNR evaluation and the national assessment done for the Canadian Council of Resource and Environment Ministers' (now Canadian Council of Ministers of the Environment) Water Advisory Committee both identified deficiencies in network coverage and basin characteristics sampled. In addition, regional issues such as prairie drought, flood forecasting, water supply, effluent disposal, pulp and paper industry expansion, and irrigation all affect water courses with limited supplies and, in many cases, with no streamflow records. For these reasons the NEPC has focused on both network evaluation and information activities.

NETWORK IMPLICATIONS

The present WNR hydrometric (including sediment) network is operated to provide data and information for an array of water management applications - including apportionment, design, regulation for water supply and environmental assessment. These applications drive the greatest portion of the network. A much smaller proportion of the network is operated to provide basic data and information on 'regional hydrology' required for reporting on the quantity and characteristics of water flows and sediment transport.

The present composition of the network, its planning priorities and output, largely reflect the traditional service orientation of WRB. Meeting client needs has and will continue to be a priority. However, this client focus must now be balanced to some extent by the need to support the suite of new directions outlined in the previous section. Establishing the relevance of hydrometric networks to priorities such as climate change, state-of-the-environment reporting, and sustainable development is challenging and doing so in a period of restraint and increasing client demands is even more challenging.

Certainly it is correct to assume that more hydrometric data and hydrologic information is required, but we need to be more specific in our identification of these implications and in setting out strategies to deal with them. *It is critical that this WRB network be shown to be responsive to departmental priorities.*

While WNR has not yet formally completed needs analyses for these priorities we can safely assume the following:

- the size and nature of the existing network compromises our ability to effectively respond to Regional scale water issues;
- the increasing emphasis on interpretation of data and on understanding hydrologic systems, has already over-stressed WRB's expertise base;
- the immensity of the new workload will necessitate strong priority setting, better working relationships between the Water Survey of Canada and Hydrology divisions, and with other branches such as Water Quality, and probably organizational structure changes - organization's dynamics may be significantly affected;
- that WRB will have to continually develop its ability to respond to departmental priorities using new products, network strategies and perspectives.

NEPC FRAMEWORK

The NEPC performs an important function for WNR by, for example:

- providing a focus for regional-scale water issues such as climate change effects, interjurisdictional transfer of water and waterborne contaminants and state-of-the-environment reporting; and,

- coordinating District NEP work planning activities for the purpose of avoiding duplication, ensuring inter-district NEP needs are compatible, maximizing the effectiveness of demonstration projects, etc.

The formal responsibilities of the Committee as set out in its Terms of Reference are:

- develop and maintain a process of network evaluation for the purpose of measuring the success of the federal and provincal/ territorial hydrometric network against stated objectives and determining necessary adjustments;

- develop staff capabilities in the techniques of network analysis and design;

- maintain close liaison with cooperators, clients, and users for the purpose of identifying data and information needs, and to provide opportunities for joint activities relating to the operation and design of the networks.

The Committee addresses these responsibilities through a number of approaches as shown in the figure on page 6.

The responsibility to support a NEP process permits the Committee to oversee the array of existing NEP activities, for example:

- preparing district NEP studies required to meet immediate needs (such as the recent reduction planning designed to meet the EG pay scale impacts);

- coordinating District work planning;

- influencing the direction and showing the relevance of specific technical studies to NEP needs;

- setting up and promoting demonstration projects designed to evaluate possible future network designs;

- coordinating new technological and technique development; and
- assessing the implications of new initiatives such as of hydraulic and morphologic surveys and fact sheets;

while designing and assessing a systematic network evaluation and planning process.

To meet its staff development capabilities the Committee has selected two approaches.

- It has linked all formal needs analyses with the ongoing WRB Training and Development Task Force exercise, which expects to undertake a Branch wide analysis, including the need for network analysis and design techniques, in early 1991. This schedule is consistent with this Committee's efforts to design a network evaluation and planning process for WNR.
- The Committee is focusing upon its own needs for understanding the use of these techniques.

Meeting the responsibility for liaison presents a major challenge for this Committee. Three approaches have been identified.

- New members have been added to the Committee. Presently a WSC Regional Engineer now sits as a formal member - the Committee recognizes that close cooperation between the two WRB Divisions is a prerequisite for a successful NEP process. Special advisor status has been offered to Chiefs WPMB and WQB Regina; Chief, Surface Water Division NHRI; and Head, WQB, Yellowknife. The attendance of these advisors or their delegates is presently discretionary.
- Undertake appropriate needs analysis required to identify and assess the implications of C&P priorities (such as SOE, sustainable development, environmental impact assessments, climate change and toxic transport) on our network design, operating process and outputs.
- Use workshops on NEP to inform clients and DOE staff in the characteristics, opportunities, outputs, etc. of the water data collection network in WNR.

The Committee reports on six themes as laid out in its Terms of Reference and as shown in the bottom line of the figure on page 6.

WNR NETWORK EVALUATION AND PLANNING COMMITTEE FRAMEWORK

RESPONSIBILITIES

Develop and maintain a process of network evaluation and planning for the purpose of measuring the success of the federal and provincial/territorial hydrometric network against stated objectives and determining necessary adjustments.	Develop staff capabilities in the techniques of network analysis and design.	Maintain close liason with cooperators, clients, and users for the purpose of identifying data and information needs, and to provide opportunities for joint activities relating to the operation and design of the networks.

APPROACHES

Adapt WRB network evaluation and planning strategy.	Undertake specific network evaluation and planning studies.	Link to WRB Training and development Task Force for Needs and Analysis.	Add new members to the Committee.
Use pilot demonstration projects.	Coordinate WNR district work plans.	Address needs of NEPC members first.	Undertake analysis of network implications of department priorities.
Prepare district network evaluation and planning studies for immediate needs.	Evaluation of new technology and techniques.		Deliver workshops on network evaluation and planning to WNR.

REPORTING

Network Evaluation	Liason	Information Products	Expertise	Meetings	Work Plans

THE YEAR IN REVIEW

While the NEPC coordinates the network planning and evaluation activities in the Region the actual work is carried out by staff, primarily from the Hydrology Division, in each of the four districts. Within WNR, about 40 person-months was devoted to activities defined by the NEPC Terms of Reference. In comparison, Hydrology Division staff expended about 140 person-months on other Branch activities such as international/international apportionment, hydrometric field surveys, EDP/DOTS systems, acting assignments, and program management.

In 1989-90 the Regional activities focused on the following areas:

Network Planning

Station Profiles have been prepared for most stations in the region, summarizing the essential features of each station for network planners and users alike. The Region has led the Branch in this process, and has recently begun publishing its station profiles for general distribution.

Geographical Information Systems for network planning purposes have been pioneered in this region. Inexpensive GIS procedures have been developed for comparing, screening, and assessing hydrometric networks, and a complete computer data base of drainage basins monitored has been completed. These techniques are now being implemented nationally by the Branch.

Hydrologic studies of floods and low flows are being carried out to improve our understanding of water variability in the region, and consequently our knowledge of how best to monitor the resource.

Information Products

Fact sheets have been prepared for select rivers and basins to provide basic interpreted information, in convenient formats, to meet the needs of the widest possible spectrum of users. Some environmental groups have commented upon the utility of this information for their purposes. Both Fact Sheets and Station Profiles have provided new opportunities for collaboration between federal and provincial agencies.

Water information, including runoff mapping, flood frequency curves, and runoff statistics have been prepared and issued to users and cooperators. These initiatives provide useful information for network evaluation as well as for hydrologic applications.

Monthly water reports have been developed and issued regularly in the region

to provide an overview and update on streamflow conditions for departmental staff and users of environmental data.

Liason

Network Planning Subcommittees have been established in some provinces to improve the federal and provincial cooperation in network planning. These subcommittees provide the basic work plans and strategies that are coordinated at the WNR Committee level.

User Workshops have been held to improve our liaison with the user community, identify needed data and information products, and to improve the awareness of available products for economic and environmental purposes. Feedback has been very positive from these workshops.

Meetings

1. May 24-25, 1989

The meeting was held in Calgary and the main items of discussion were:

- The Committee's Terms of Reference were reviewed. The most notable changes recommended to the Management Committee were the inclusion of the Chief, Water Planning and Management Branch as Special Advisor and the addition of a Regional Engineer to the Committee. Each Regional Engineer in WNR will serve a two year term on a rotational basis.
- The format and the content for the annual report to the Management Committee was discussed and agreement reached on a proposed outline. The first report will be prepared for 1989-90.
- Vir Khanna, WRB Calgary gave a presentation on the applicaton of the GLS method in the network analysis in Alberta.
- John Power, Hydrology Division,HQ gave a demonstration of the Nucor GIS to the Committee and interested staff from Calgary.
- The achievements for 1988-89 and plans for 1989-90 were discussed.

2. September 28, 1989

A brief meeting was held in Guelph in conjunction with the annual Regional Hydrologist meeting. The main purpose of the meeting was to determine the status of workplan items and to consider work planning for 1990-91.

The following section provides a description of the key projects undertaken in the Region and indicates their present status.

Network Evaluation and Planning

1. Hydrometric Station Profiles

Hydrometric station profiles are being prepared for all stations in the region. The profiles provide a summary of information including: the purpose for the station, history of the station, data users, data quality, physical changes in the basin, and studies that pertain to the station. The profiles are neccesary for hydrometric network planning and will also benefit consultants, water resource managers, planners, and individuals interested in water resources. It is intended that these profiles be updated on a continual basis.

In 1989 - 90, hydrometric station profiles were completed for all active stations in the Saskatchewan District. The profiles were distributed in two-binder sets to 14 users and on microfiche to 41 users. In addition, announcements were sent to 114 individuals and a display advertisement appeared in the "Professional Edge", a newsletter published by the Association of Professional Engineers of Saskatchewan.

In a cooperative project with Alberta Environment, a first draft of hydrometric station profiles for all active stations in Alberta was completed and entered into an ORACLE database. To supplement the hydrometric station profiles, the results of high and low flow analyses for approximately 150 active stations in southern Alberta have been compiled and are available to users as hydrologic profiles.

During 1989-90, 71 hydrometric station profiles were completed in the Manitoba-NW Ontario District, 12 of which were prepared by the Manitoba Water Resources Branch. This brings the total number of completed profiles to 180. Completed profiles were provided to 11 profile binders distributed within CWRB, Manitoba Hydro and Manitoba Water Resources Branch. Additional copies were provided to consultants, water resource managers and individuals as requested.

2. Assiniboine River Basin Integrated Networks Study

As growing demands are placed upon the water resources of a basin, watershed or region, concerns emerge for the sustainability of water ecosystems and the physical and social environments in general. Increasingly an integrated scietific knowledge of the terrestrial, aquatic, and atmospheric environments are required by the resource manager. To facillitate development of this knowledge, a greater integration of network planning and

a greater coordination of data aquisition programs are required.

The Assiniboine River Basin Integrated Networks Study sets out to develop an integrated approach to the evaluation and planning of its hydrometric and sediment data collection networks. The project utilizes the Geographic Information System, SPANS, as the means for integration through which a great deal of basic information previously not easily accessible (physiographic, climatic, land use, water quality, administrative) can be retrieved. Through a combination of qualitative analyses and graphical display, the relevant data networks and databases will be fully inventoried, and appropriate linkages identified. The project serves to evaluate the existing WRB networks and represents a first step in acquiring an integrated scientific knowledge of the water resouce environment in the basin.

The project will be completed in two phases: Phase 1 is underway and consists of the collection of information and data related to the basin; Phase 2 will center on the evaluation of the network. The project will culminate in a final basin report by March 31, 1992.

It is envisaged that during the course of the project a number of information products, such as, reports, papers, and fact sheets may be produced. The focus of these could range from assessments of individual networks to the availability of GIS products and databases.

3. Red Deer River Basin Network Evaluation - Phase 1

The purpose of the evaluation is two-fold:

- to ensure that the network continues to meet current and anticipated demands for data and information in an efficient manner and
- to apply Geographic Information Systems (GIS) technology (in this case SPANS) to water resources planning and decision making.

An integrated approach will be used in the evaluation of the network and subsequent preparation of the development plan. Phase 1 consists of the collection of information and data related to the basin and Phase 2 will center on the evaluation of the network and development plan.

A draft report is now being written for Phase 1. Water Planning and Management Branch made a significant contribution to the study by researching and writing the sections on landuse and socio-economic aspects.

4. Manitoba Hydrometric Network Reduction Strategy

As a consequence of ongoing budgetary constraints, reduction in the 1990-91 hydrometric program, cost shared by Canada and Manitoba, had become a matter for serious consideration. To meet available resource levels, a network reduction strategy was prepared by the Canada-Manitoba Network Evaluation and Planning Subcommittee. The strategy consisted of a prioritized list of stations targeted for discontinuation.

The prioritized list was based on an integration of existing data and information, including the results of the 1986 Manitoba Users' Survey and the CWRB "Pragmatic" Network Evaluation. Where available, correlation statistics and data quality indicators were incorporated into the decision process. The distribution of stations with respect to record length and drainage area, by watershed and physiographic region, was also reviewed to ensure that hydrologically unique stations would not be discontinued without due consideration. Finally, operational factors such as travel time, transportation mode, and condition of existing station infrastructure was evaluated.

5. Regionalization of Low Flows in Southern Alberta

The regionalization analyses for the Oldman, Bow, Red Deer, Battle, and North Saskatchewan river basins is the initial step in a plan to evaluate the hydrometric network for its ability to define the hydrologic regime in Alberta.

The analytical work for the application of the generalized least squared technique to low and high flows in the Oldman River basin has been evaluated. It is intended to use this technique to first evaluate the existing network in the basin and subsequently to design an optimum network.

A first draft of the report has been completed and is undergoing peer review.

6. Availability of Small Watershed Hydrometric Data in Alberta

Hydrometric stations on small, unregulated basins (drainage area $<= 100\ km^2$) in Alberta are presented in terms of location drainage area and record lengths. The report will be useful to those users involved in small scale water projects, hydrologic modelling or other hydrologic studies. Information on 42 active and 89 discontinued stations is included in the report. The stations are sparsely distributed in the province and have short record lengths.

A first draft of the report has been written.

7. Sediment Station Management Plans

While primarily an operational management tool for guiding field sampling, the station managment plans contribute to network evaluation and planning by providing annual status reports on the success of station programs as well as providing a first interpretation of the data.

This year sediment station management plans were completed for Saskatchewan and Manitoba.

8. Assiniboine River Basin Sediment Study

A comprehensive analysis of sediment data in the Assiniboine River basin was completed by consultant Dr. P. Ashmore. The analysis includes an assessment of the existing database with respect to sediment regime; concentration, load, yield, routing, data coverage and adequacy. The study also evaluates other databases of use in interpreting the sediment regime, particularly hydrology, land use, soils, surficial geology and geomorphology. Recommendations are provided with respect to future monitoring activities in the basin. The study constitutes a key input to the Assiniboine River Basin Integrated Networks Study.

The report is undergoing final review and will be published in 1990-91.

9. Off-Farm Sediment Effects Study

This project completed under contract to M.A. Carson and Associates is an assessment of the nature, extent, and effects of off-farm sediment impacts in the Saskatchewan River system as they relate to stream borne sediments and associated contaminants.

Key conclusions include: impacts are both physical and chemical; off-farm impacts are progressively diluted by sediments contributed by river banks. The results of the study will be used in the design of sediment monitoring programs.

10. Roseau River Sediment Station Analysis

This contracted study reviews and synthesizes sediment data at two sites on the Roseau River. The report characterizes sediment transport and assesses the

adequacy of the existing data. Recommendations on specific remedial sampling actions were made which support WRB's decision to terminate regular sampling at the two sites.

11. Athabasca Sediment Station Analyses

This contracted study reviews the sediment transport database for the Athabasca River with a view to its application to environmental impact studies of the propsed pulp and paper mill developments. A wide range of recommendations were formulated on aspects of program design and sampling procedures. Remedial sampling needs were identified.

This study and its remedial recommendations will permit WRB to contribute to the various river studies now being proposed for the Peace-Athabasca River system.

Information Products

1. Flood of September 1986 in the Watersheds of Lodge, Battle, and Lyons Creeks, Southwest Saskatchewan

The report documents the meteorological event (the only occassion in recorded history where a tropical storm affected Saskatchewan) and the subsequent flood event which exceeded previous recorded peaks on all three basins. The storm resulted from a combination of factors, including former hurricane Newton and former tropical storm Madeline. The storm system developed over Montana and moved cyclonically in a northwest direction to Saskatchewan generating high winds and heavy rainfall during a 48 hour period. Data from sixteen hydrometric stations were analyzed and frequency analyses were conducted for those stations for which streamflow regulation is negligible.

A paper on the flood event has been accepted for presentation at the 24th Annual Congress of CMOS on Climate Variability - Causes and Consequences. The Congress will be held May 28 -June 1, 1990 in Victoria, B.C..

2. The Spring Flood of 1988 in the Duck Mountain and Porcupine Hills Region of Manitoba

The report, prepared jointly with Manitoba Water Resources Branch and

Atmospheric Environment Service, documents the event which resulted from a rapid snowmelt in the region, followed by a major rainstorm. The report brings together dispersed data and information on the causes and effects of the flood and examines the adequacy of the data collection networks, the flood warning and emergency response systems, and the nature and extent of damages sustained. The report also contains meteorologic and hydrologic analyses and a statistical interpretation of the event.

The final draft is being prepared.

3. Hydraulic and Morphologic Fact Sheets

A series of fact sheets was initiated to summarize hydraulic and morphologic data for selected sites. Hydraulic and morphologic surveys are designed to make better use of existing hydrometric data, to expand our understanding of gauge sites and to study large scale river morphologies. These studies and the increased Branch expertise in river studies will be important to clients and to the Department's responsibilities for environmental impact assessment. The information displayed in the fact sheet define the character of a specific river reach with respect to water transport, hydraulic resistance, channel and basin geometry, and bed stability. This information is important for technical and management decisions in the design, construction and evaluation of engineering and environmental projects.

Saskatchewan District released the Branch's first hydraulic and morphologic fact sheet, Qu'appelle River below Loon Creek. The fact sheet is based on a Level 2 survey and provides cross-sectional, boundary material, hydrologic, and geologic information relevant to understanding the character and the processes at this site. The fact sheet was distributed to 97 users, and announcements of this new product were sent to 30 potential users. Because of the favorable response it is planned to prepare, on average, one hydraulic and morphologic fact sheet per year for the Saskatchewan District.

In the Manitoba and NW Ontario District, hydraulic and morphologic fact sheets were drafted for the Red River at Emerson and the Souris River at Wawanesa. The fact sheets to a significant extent draw upon and synthesize unpublished data and information. The fact sheet for the Red River at Emerson complements the hydrologic fact sheet prepared for this site (see item 4). Distribution will be in the fall of 1990.

While the Branch has yet to devise a long-term implementation plan for hydraulic and morphologic surveys, most districts are committed to completing a survey in 1990-91.

4. Hydrologic Fact Sheet - Red River at Emerson

The hydrologic fact sheet, prepared jointly with the Manitoba Water Resources Branch, provides a hydrologic and operational summary for the station and also identifies the major needs for and uses of the data. A statistical interpretation of the data provides a basic knowledge of the amount and variability of streamflows.

The fact sheet serves a varied audience of water managers, professionals and the public. This is borne out by the history of data and information requested for this hydrometric station.

5. Runoff Conditions Reports

A monthly runoff conditions report was prepared and distributed for the Manitoba-NW Ontario District throughout 1989-90. The report is designed to provide water managers with an overview of the current distribution of water supplies in the District. The report also provides a comparison of current trends to historic water levels and discharges for key lakes and streams.

PLANS FOR 1990-91

In the present economic climate there is increasing pressure to reduce the cost of operating the hydrometric network and unfortunately the response has often been to reduce the size of the network. Without a comprehensive network plan in place for the region the decision on which stations to discontinue is often made on the basis of little information or knowledge of a particular station's contribution to the overall network. The hydrometric network has reached a state of maturity whereby errors in judgement can have a tremendous impact on the strength of the database. The Branch has been criticized for rash decisions, for example at workshop sponsored by the B.C. Branch of the CWRA (January 24, 1990)

> "A hot topic of discussion was the current practice of the Water Survey of Canada in discontinuing stream gauging stations on many small rivers after 12 or 15 years".

It is imperative that WRB develop a comprehensive integrated network plan for the region in a relatively short time frame but with the present level of staff and resources it would likely require 10 - 15 years to complete. This is too long. Decisions on changes to the network are required now and without a network plan these decisions will become more difficult each year.

The plans, detailed below, for 1990-91 will again focus on network planning and information activities.

Network Evaluation and Planning

1. Hydrometric Station Profiles

In cooperation with Alberta Environment, all profiles for hydrometric stations in Alberta will be updated. About 120 profiles for Saskatchewan will be reviewed as part of the established 3-year review cycle. In cooperation with provincial agencies about 100 profiles will be completed for stations in Manitoba and NW Ontario. NWT will investigate the implementation of station profile forms and information in computer file format and provide recommendations and proposed workplan for the completion of station profiles in NWT.

2. Data Analysis

- Followup with WSC on recommendations prepared in 1989-90 on the

development of a rating curve for the Atikokan River near Atikokan.

- Investigate influence of Antler River flows on the stage-discharge relationship at Souris River near Coulter.

- Review historic peak discharge of Simonette River, using basin simulation modelling techniques.

- Review Mackenzie River sediment data and update historical records as required.

3. Network Reduction Strategy

Conduct, in cooperation with Coordinating Committee members, an assessment of the NWT water quantity network to plan and manage anticipated network reductions arising from budget restrictions and an ongoing program evaluation of the existing network in Alberta.

4. NWT Prototype River Basin Management Study

Prepare a detailed hydrometric component program proposal and budget for the proposed interagency NWT Prototype River Basin Management Study (Yellowknife River).

5. Flood Forecasting

Define the hydrometric gauging or data retrieval capabilities required to support the proposed Canada-NWT Flood Forecast Agreement.

Prepare preliminary DOE assessment of flood forecasting options used in WNR for consideration by DOE, DIAND, and GNWT officials in defining options, costs and a time frame for comprehensive technical work on territorial flood forecasting under the proposed Canada-NWT Flood Forecast.

6. Compilation of Hydraulic and Morphologic Parameters for Fisheries Projects

In cooperation with Manitoba Fisheries and DFO, generate and compile hydraulic and morpholgic data and information for the Turtle and/or Valley Rivers to serve stream rehabilitation and fisheries management.

This initiative follows on the recommendations of the 1986 report entitled "The Use and Publication of Hydraulic and Morphologic Data for Canadian Rivers" by Northwest Hydraulic Consultants, and in response to the information needs expressed at the 1986 Manitoba Sediment Issues Workshop and 1988 Manitoba Data Users Workshop.

7. Assiniboine River Basin Integrated Networks Study

Continue with Assiniboine River Basin Integrated Networks Study.

8. Network Planning Strategy for Saskatchewan

Develop strategy for the network planning process in Saskatchewan.

9. Red Deer River Basin Network Evaluation

Complete Phase l of Red Deer Study and prepare a draft report.

10. Publication of Reports

Reports for the following projects will be published:

- Application of Pragmatic Approach to Network Evaluation in Manitoba and NW Ontario
- Assiniboine River Basin Sediment Study
- 1988 Flood in the Duck Mountain and Porcupine Hills Area of Manitoba
- Yellowknife River Basin Overview Study
- 1988 Liard/Mackenzie Flood
- Application of Ordinary Least Squares to Oldman, Red Deer, Bow, Battle, and North Saskatchewan River Basins
- Network Evaluation for High and Low Flows in the Oldman River Basin
- Application of the Tank Model and Preliminary Results in the Macleod River Basin

Information Products

1. Runoff Conditions Reports

Depending on user interest, prepare and distribute a monthly report on reservoir storage conditions in the Frenchman, Battle, and Lodge basins.

Produce a prototype monthly streamflow conditions report for the NWT.

Continue to prepare and distribute a monthly runoff conditions report for Manitoba and NW Ontario.

2. Papers/Conferences/Workshops

In cooperation with DIAND give a presentation on "floods in the territories" at the national workshop series on Floods in Canada.

Serve on Organizing Committee for the 1990 International Symposium on Water Resource Systems Applications. Chair session on Policy Analyses.

Participate in the WRB Hydrology-Sediment Network Evaluation and Planning Workshop.

Complete papers on:

- availability of small watershed hydrometric data in Manitoba and NW Ontario
- mean annual surface runoff in Manitoba
- single station flood frequency analyses
- role of data in drought planning and management - a joint WPMB/WQB/WRB paper for presentation at CONSERV 90.

3. Public Relations

Direct Branch involvement in Environment Week activities in Regina, Winnipeg, and Yellowknife and in National Wildlife Week in Calgary.

Give presentations on the environment and water to at least two schools and service organizations.

4. New Information Products

Prepare and distribute a Users Guide to the Transport Canada/IWD Mackenzie River Flow Forecast service.

Prepare territorial communications plan defining information products on water quantity, quality and sediment programs (and complementary data sets) required to meet territorial needs.

5. Fact Sheets

Prepare prototype station, basin and topic fact sheets on the South Nahanni River basin, in cooperation with Water Quality Section, Canadian Parks Service, and Canoe Arctic, as part of the South Nahanni River Basin Overview Study.

Distribute the Red River at Emerson hydrologic fact sheet.

Finalize and distribute hydraulic and morphologic fact sheets for Souris River at Wawanesa and Red River at Emerson.

Produce a geomorphology fact sheet in cooperation with Alberta Research Council.

Liaison

Advise on and participate in Arctic College, Thebacha Campus course on water resources and provide assistance and advice to University of Manitoba thesis and research programmes.

Provide CDP training to WSC Division staff in Manitoba on 'Indirect Determination of Discharge' and 'Artificial Controls'.

Participate in Water Quantity Survey Coordinating Committee meetings to advise on network planning and special studies of floods and other topics.

Establish a Network Evaluation and Planning Committee in NWT (NWT NEPC) for inter-agency cooperation in hydrometric, sediment, water quality, meteorologic, snow course and other water resource data collection activities. Produce a summary report on current agency activities and networks, as well as recommendations for further work and a proposed workplan.

Cooperate with DIAND in testing the University of Alberta ice jam flood forecast algorithm in Hay River during the 1990 spring flood, reporting on its' use and value and carry out required modifications or enhancements for 1991 use.

WESTERN & NORTHERN REGION

NETWORK EVALUATION & PLANNING COMMITTEE
TERMS OF REFERENCE

1. BACKGROUND

Water Resources Branch (WRB) of Inland Waters Directorate (IWD) of Western and Northern Region (WNR) operates - streamflow, water level, and sediment stations in territory covering diverse hydrologic conditions. However, increasing demands for water resource data are being felt from many sectors, despite current economic and financial constraints.

It is therefore important to ensure that the region's hydrometric and sediment networks are deployed and operated as efficiently as possible, while still maintaining basic responsibilities for inventorying water quantity, defining hydrologic and geomorphologic conditions in distinct zones, providing data and information to meet specific federal, provincial and territorial responsibilities, as well as providing reliable water data for water managers and users.

Previous investigations and analyses have been carried out in the WNR for the purpose of planning and adjusting the hydrometric network and evaluating the sediment program. The results have served as the basis of design for many years, but this process requires periodic review and updating as conditions change.

In August, 1986 the WNR completed an evaluation report entitled, "Summary Report - WNR Hydrometric Network Evaluation and Planning Activities", in which several recommendations were made regarding network planning. The region was instructed to:

a) develop and maintain a process of network evaluation for the purpose of measuring the success of the federal and provinces/territories hydrometric network against stated objectives and determining necessary adjustments.

b) develop staff capabilities in the techniques of network analysis and design.

c) maintain close liason with cooperators, clients, and users for the purpose of identifying data and information needs, and to provide opportunities for joint activities relating to the operation and design of the networks.

Accordingly, the Regional Director of the WNR at the regional management meeting of Jan 13, 1987 directed that a committee be formed to carry out these recommendations and to coordinate and to provide network planning activities in the region. The scope of the committee's activities shall include the development of short and long term action plans, negotiation and carrying out of studies and investigations through WRB staff and other agencies, liason with current and potential clients and data users, development of staff expertise, and preparation of interpretive reports and information regarding the networks.

2. REPORTING STRUCTURE

The Committee shall be responsible to a management group composed of,

Regional Director, IWD, WNR - Chairman
Chief, NWT Programs, Yellowknife
Regional Chief, WRB, Calgary
Regional Chief, WRB, Regina
Regional Chief, WRB, Winnipeg

3. MEMBERSHIP

The membership is to be structured as follows:

A. Committee Members (attendance at meetings is mandatory)

Member representation from district hydrology sections in:

IWD, Yellowknife
WRB, Calgary
WRB, Regina
WRB, Winnipeg, and the
Regional Sediment Specialist, Winnipeg

These members shall elect a Chairman and Secretary from amongst themselves. The Chairman and Secretary will serve for a two-year term. Other members of the committee are:

Head, Sediment Surveys Section, Ottawa
Chief, Hydrology Division, Ottawa
Regional Engineer, Water Survey of Canada, WNR

The Regional Engineer will serve a two-year term which will rotate among Calgary, Regina, Winnipeg, and Yellowknife.

B. Special Advisors (attendance at meetings is discretionary)

Chief, Water Planning and Management Branch, Regina
Chief, Water Quality Branch, W&NR, Regina
Head, Water Quality Branch, IWD, Yellowknife
Chief, Surface Water Division, NHRI

4. MINUTES

Minutes shall be kept and distributed to members, special advisors and the management group.

5. ANNUAL REPORT

The Committee shall present an annual report to the management group.

6. WORK PLANS

The Committee is to develop plans in a three-year framework to be updated annually. A regional NEP workplan is to be prepared in November of each year and submitted to the management group. The management group will review the plan and advise the NEPC of any required changes by mid-December. The approved plan will then be incorporated into district work plans.

7. NETWORK EVALUATION

All proposed changes to hydrometric and sediment networks shall be reviewed by the appropriate committee member(s) who shall provide recommendations to the respective Chief(s) for further consideration by the appropriate Coordinating Committee for Water Quantity Agreements.

8. LIASON

The Committee is to maintain liason with their clients and users both actual and potential, with OGD's, with the greater hydrologic community and with agencies in their own directorate to incorporate new technology, to maintain consistency of the regional approach in a national context, to develop a common perspective on networks and to provide a vehicle for joint studies with other agencies.

9. INFORMATION PRODUCTS

The Committee shall prepare state-of-the-environment, outward-looking, periodic products related to WNR such as maps, scientific papers, technology transfer workshops and specific contributions to SOE reports.

10. EXPERTISE

The Committee shall develop and maintain NEP expertise in the district offices of WNR by organizing workshops, seminars, guest presentations and other similar activities.

11. MEETINGS

Committee shall serve as a coordinating mechanism for NEP district activities in WNR. It shall meet at least semi-annually to address this issue. The meetings will normally be held in the spring, to report on the previous year's accomplishments and to review current year plans, and the fall (in conjunction with the Regional Hydrologists' Annual Meeting), to establish work plans for the coming year.

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